

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: William FORD et al.

Filed: Filed Concurrently Herewith

Title of Invention: LINKER MOLECULES FOR SELECTIVE  
METALLISATION OF NUCLEIC ACIDS AND THEIR  
USES

745 Fifth Avenue  
New York, NY 10151

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Sameer Abdulsattar

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**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Box Patent Application (35 U.S.C. 111)  
Washington, D.C. 20231

Sir:

Before the issuance of the first Office Action, please amend the above-identified application as follows:

**IN THE CLAIMS:**

Please amend claims 8, 9, 10, 12, 14-19, 21, 22, 25, 26 and 30 as follows:

8. (Amended) A linker molecule according to claim 1, wherein the nanoparticle binding group comprises at least one covalent bond forming functional group selected from carboxylic acids and derivatives thereof, sulfonic acids and derivatives thereof, amines, alcohols, thiols, aldehydes, ketones, isocyanates, isothiocyanates, ethers, and halides.
9. (Amended) A linker molecule according to claim 1, wherein the nanoparticle binding group comprises at least one metal-binding group selected from amines, phosphines, thiols, disulfides, dithiocarbamates, dithiophosphates, dithiophosphonates, thioethers, thiosulfates, and thioureas.
10. (Amended) A method for the manufacture of a nanoparticle comprising conjugate, wherein a nanoparticle is combined with a linker molecule according to claim 1, forming a nanoparticle/linker conjugate.
12. (Amended) A method for the manufacture of a nucleic acid comprising conjugate, wherein a nucleic acid molecule is reacted with a linker molecule according to claim 1, forming a nucleic acid/linker conjugate.
14. (Amended) A method according to claim 11, characterized in that the nucleic acid is present dissolved in solution, preferably in an aqueous solution or immobilized on a substrate, preferably a non-metallic substrate or an electrode structure.
15. (Amended) A method according to claim 11, characterized in that the nucleic acid is selected from the group comprising natural, modified, synthetic, and recombinant nucleic acids, DNA, RNA, PNA, CNA, oligonucleotides, oligonucleotides of DNA, oligonucleotides of RNA, primers, A-DNA, B-DNA, Z-DNA, polynucleotides of DNA, polynucleotides of RNA, T-junctions of nucleic acids, triplexes of nucleic acids, quadruplexes of nucleic acids, domains of non-nucleic acid polymer-nucleic acid blockcopolymers and combinations thereof.

16. (Amended) A method according to claim 11, characterized in that the nucleic acid is double-stranded or single-stranded.
17. (Amended) A method according to claim 10, characterized in that the nanoparticle is catalytically active towards electroless plating.
18. (Amended) A method according to claim 10, characterized in that the nanoparticle contains a metal selected from the group comprising Fe, Co, Ni, Cu, Ru, Rh, Pd, Os, Ir, Pt, Ag, Au and combinations (e. g. alloys) of these metals.
19. (Amended) A method according to claim 10, characterized in that the nanoparticle's size is less than 10 nm.
21. (Amended) A nanoparticle/linker conjugate or nucleic acid/linker conjugate obtainable according to a method of claim 10.
22. (Amended) A nanoparticle-nucleic acid composite obtainable according to a method of claim 11.
25. (Amended) A method according to claim 23, characterized in that the metal deposited by electroless plating is selected from the group comprising Fe, Co, Ni, Cu, Ru, Rh, Pd, Os, Ir, Pt, Ag, Au and combinations (e. g. alloys) of these metals and magnetic and/or magnetized Fe, Co, Ni, and combinations (e. g. alloys) of these metals, and combinations (e. g. alloys) of these metals with B or P.
26. (Amended) Nanowire obtainable by a method according to claim 23.
30. (Amended) Use of the method according to claim 10 for selective metallisation of a nucleic acid.


**REMARKS**

Claims 1-30 remain in the application. Claims 8, 9, 10, 12, 14-19, 21, 22, 25, 26 and 30 have been amended to eliminate multiple dependencies. Attached hereto is a marked up version of the changes made to claims 8, 9, 10, 12, 14-19, 21, 22, 25, 26 and 30 by the current amendment. The attached page is captioned **"Version with markings to show changes made."** The filing fee has been calculated based upon these amendments to the claims.

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP  
Attorneys for Applicants

By:

  
William S. Frommer  
Reg. No. 25,506  
Tel. (212) 588-0800

**VERSION WITH MARKINGS TO SHOW CHANGES MADE****In the claims:**

8. (Amended) A linker molecule according to claim 1 ~~or~~ 7, wherein the nanoparticle binding group comprises at least one covalent bond forming functional group selected from carboxylic acids and derivatives thereof, sulfonic acids and derivatives thereof, amines, alcohols, thiols, aldehydes, ketones, isocyanates, isothiocyanates, ethers, and halides.
9. (Amended) A linker molecule according to claim 1 ~~or~~ 7, wherein the nanoparticle binding group comprises at least one metal-binding group selected from amines, phosphines, thiols, disulfides, dithiocarbamates, dithiophosphates, dithiophosphonates, thioethers, thiosulfates, and thioureas.
10. (Amended) A method for the manufacture of a nanoparticle comprising conjugate, wherein a nanoparticle is combined with a linker molecule according to claim 1 ~~any of claims 1 to 9~~, forming a nanoparticle/linker conjugate.
12. (Amended) A method for the manufacture of a nucleic acid comprising conjugate, wherein a nucleic acid molecule is reacted with a linker molecule according to claim 1 ~~any of claims 1 to 9~~, forming a nucleic acid/linker conjugate.
14. (Amended) A method according to claim 11 ~~any of claims 11 to 13~~, characterized in that the nucleic acid is present dissolved in solution, preferably in an aqueous solution or immobilized on a substrate, preferably a non-metallic substrate or an electrode structure.
15. (Amended) A method according to claim 11 ~~any of claims 11 to 14~~, characterized in that the nucleic acid is selected from the group comprising natural, modified, synthetic, and recombinant nucleic acids, DNA, RNA, PNA, CNA, oligonucleotides, oligonucleotides of DNA, oligonucleotides of RNA, primers, A-DNA, B-DNA, Z-DNA, polynucleotides of DNA,

polynucleotides of RNA, T-junctions of nucleic acids, triplexes of nucleic acids, quadruplexes of nucleic acids, domains of non-nucleic acid polymer-nucleic acid blockcopolymers and combinations thereof.

16. (Amended) A method according to claim 11 ~~any of claims 11 to 15~~, characterized in that the nucleic acid is double-stranded or single-stranded.

17. (Amended) A method according to claim 10 ~~any of claims 10, 11 or 13~~, characterized in that the nanoparticle is catalytically active towards electroless plating.

18. (Amended) A method according to claim 10 ~~any of claims 10, 11, 13 or 17~~, characterized in that the nanoparticle contains a metal selected from the group comprising Fe, Co, Ni, Cu, Ru, Rh, Pd, Os, Ir, Pt, Ag, Au and combinations (e. g. alloys) of these metals.

19. (Amended) A method according to claim 10 ~~any of claims 10, 11, 13 or 17~~, characterized in that the nanoparticle's size is less than 10 nm.

21. (Amended) A nanoparticle/linker conjugate or nucleic acid/linker conjugate obtainable according to a method of claim 10.

22. (Amended) A nanoparticle-nucleic acid composite obtainable according to a method of claim 11 ~~any of claims 10, 13, and 14 to 20~~.

25. (Amended) A method according to claim 23 ~~or 24~~, characterized in that the metal deposited by electroless plating is selected from the group comprising Fe, Co, Ni, Cu, Ru, Rh, Pd, Os, Ir, Pt, Ag, Au and combinations (e. g. alloys) of these metals and magnetic and/or magnetized Fe, Co, Ni, and combinations (e. g. alloys) of these metals, and combinations (e. g. alloys) of these metals with B or P.

26. (Amended) Nanowire obtainable by a method according to claim 23 ~~any of claims 23 to 25~~.

30. (Amended) Use of the method according to claim 10 ~~any of claims 10 to 20~~ for selective metallisation of a nucleic acid.

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